Dewain

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ESC-166/99
September 30, 1999

99-TC/09-30

Mr. Richard B. Provencher, Director
Miamisburg Environmental Management Project
U.S. Department of Energy
P. O. Box 66
Miamisburg, OH 45343-0066

MIAMISBURG
LOG C0025 40
SEP 30 3 47 PM '99

ATTENTION: Jack Zimmerman

SUBJECT: Contract No. DE-AC24-97OH20044
GROUNDWATER MONITORING PROGRAM REVIEW
(Deliverable C.7.1c)

REFERENCE: DOE Order 5400.1 requires that the *Groundwater Monitoring Program and Groundwater Protection Management Program Plan* be reviewed annually.

Dear Mr. Provencher:

BWO has completed its annual review of the *Groundwater Monitoring Program and Groundwater Protection Management Program Plan*. Enclosed is a summary of changes to the Plan since its last annual review in September 1998. Several tables summarizing the current groundwater monitoring program are also enclosed.

If further information is required at this time, please contact Ronald Paulick at extension 4080 or Dave Rakel at extension 4203.

Sincerely,

Linda R. Bauer, Ph.D.
Manager, Environmental Safeguards & Compliance

LRB/rpp

Enclosures

cc: DCC

Summary of Changes to the
Groundwater Monitoring Program and Groundwater Protection Management Program Plan

Pursuant to DOE Order 5400.1, an annual review of the *Groundwater Monitoring Program and Groundwater Protection Management Program Plan* (GWP) has been completed. Changes since last year's review of Revision 2 of the GWP are listed below.

Safe Drinking Water Act Monitoring (SDWA) Requirements
The monitoring requirements for drinking water have not changed. The non-compliance reporting time for lead and copper was corrected in the SDWA summary table. Lead and copper results are to be reported within 10 days after the monitoring period not within 10 days of monitoring.

Community Assurance
There are no changes.

Early Warning
Collection of weekly tritium samples from on-site monitoring trenches is seasonally dependent. The groundwater summary table was updated to reflect seasonally dependent monitoring.

Assure Containment
As a result of damage, well 0129 has been abandoned. This location has been replaced by well 0388.

Site-Worker Assurance
There are no changes.

OU1 Effectiveness
Semiannual sampling of wells 0319, 0344, 0400, and 0402 for VOCs will be added for calendar year 2000.

Limited Field Investigation Supplemental Monitoring (additional scope)
Semiannual sampling of wells 0347 and 0411 for VOCs will be added to the field scope.

In 2000, field work to investigate the nature and extent of tritium levels in wells that were hydrologically completed in the lower portion of the buried valley aquifer will begin. Wells P026, 0302, 0303, 0304, 0330, 0342, 0343, 0347, 0356, 0386, 0387, and 0389 will be monitored quarterly for tritium.

Sample Location	Test Parameter	Sampling Frequency	Compliance Parameter	Non-Compliance Reporting Time	Non-Compliance Action
Potable water taps	Micro-biological	2 samples per month	1 positive per 100 mL	Close of next business day	Set of 4 replicate samples for each positive within 24 hours
	Lead Copper	20 samples semiannually	15 µg/L 1300 µg/L	Within 10 days after the monitoring period	Implement corrosion control program
Production wells 0071, 0271, 0076, and distribution system locations D01 and D02	Inorganics	Every 3 years (1997)	MCL for the distribution system	48 hours	Confirmation sample within 2 weeks
	Nitrate	Annually	50% of MCL for distribution system	48 hours	Quarterly monitoring
			Exceed MCL for the distribution system	48 hours	Confirmation sample within 24 hours
	VOCs	Quarterly	MCL for the distribution system	48 hours	Implement best available treatment (OU 1 or provide alternative source of water)
	Synthetic organic chemicals	Once every 3 years (1997)	MCL for the distribution system	48 hours	Quarterly monitoring
	Gross alpha	Annually	>5 pCi/L	48 hours	Re-sample within 2 weeks for Ra-226/228
			>15 pCi/L	48 hours	Conduct non-compliance action
	Gross beta	Annually	50 pCi/L	48 hours	Identify major radiological constituents in the sample; conduct non-compliance action
	Tritium	Annually	20 nCi/L	48 hours	Conduct non-compliance action

Objective	Parameters	Sample Location	Sampling Frequency
OU 1 Effectiveness	VOCs	Monitoring wells on-site: P015, P025, P027, P031, P043, P044, P045, P046, 0063, 0305, 0308, 0313, 0317, 0370, 0373, 0374, 0397, 0410, 0415, 0416, 0417, 0418, 0419, 0420, 0421, 0422, 0423, 0424, 0425	Quarterly
	VOCs	Monitoring wells on-site: 0319, 0344, 0400, 0402	Semi-annually
Limited Field Investigation	VOCs	Monitoring wells on-site: 0312, 0315, 0347, 0411	Semi-annually
		Monitoring wells off-site: 0386, 0389	Semi-annually
		Monitoring wells off-site: 0387, 0392	Annually
	Tritium	Monitoring wells on-site: 0347, 0356	Quarterly
		Monitoring wells off-site: P026, 0302, 0303, 0304, 0330, 0342, 0343, 0386, 0387, 0389	Quarterly

Pu = plutonium
Ra = radium
Th = thorium
U = uranium

MCL = maximum contaminant level
TAL = target analyte list
VOCs = volatile organic compounds

Objective	Parameters	Sample Location	Sampling Frequency
OU 1 Effectiveness	VOCs	Monitoring wells on-site: P015, P025, P027, P031, P043, P044, P045, P046, 0063, 0305, 0308, 0313, 0317, 0370, 0373, 0374, 0397, 0410, 0415, 0416, 0417, 0418, 0419, 0420, 0421, 0422, 0423, 0424, 0425	Quarterly
	VOCs	Monitoring wells on-site: 0319, 0344, 0400, 0402	Semi-annually
Limited Field Investigation	VOCs	Monitoring wells on-site: 0312, 0315, 0347, 0411	Semi-annually
		Monitoring wells off-site: 0386, 0389	Semi-annually
		Monitoring wells off-site: 0387, 0392	Annually
	Tritium	Monitoring wells on-site: 0347, 0356	Quarterly
		Monitoring wells off-site: P026, 0302, 0303, 0304, 0330, 0342, 0343, 0386, 0387, 0389	Quarterly

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Groundwater Monitoring Program

and

Groundwater Protection Management Program Plan

U.S. Department of Energy
Mound Environmental Management Project

Environmental Restoration Program
Environmental Monitoring Program

August 1997
Revision 2

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Acknowledgments

This work was accomplished under the direction of Mr. Arthur Kleinrath of the U.S. Department of Energy (DOE). Mr. Kleinrath is the Remedial Project Manager for the Environmental Restoration Program at the Mound Plant.

This document was prepared by EG&G Mound Applied Technologies with technical assistance from Terran Corporation of Beavercreek, Ohio. Principal authors were Ron Paulick and Jim Rigano of EG&G and Roger McCready and Brent Huntsman of Terran. Susan Cloud, Debbie White, Patricia Brechlin, Alec Bray, and Mark Gilliat provided document technical review. Manuscript word processing and graphics were rendered by Sandra Allen and Renee Bicknell.

Abbreviations and Acronyms

ARAR	Applicable or relevant and appropriate requirement
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, known as Superfund: Amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA)
CLP	Contract Laboratory Program
CWA	Clean Water Act
DOE	Department of Energy
EMP	Environmental Monitoring Plan
ER	Environmental Restoration
FFA	Federal Facilities Agreement
FSP	Field sampling plan: Defines the details of sampling and data gathering activities to be used at a site. (See SAP).
MCL	Maximum contaminant level: Established under the Safe Drinking Water Act
MCLG	Maximum Contaminant Level Goal
MEIMS	Mound Environmental Information Management System
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List: A list of sites identified for remediation under CERCLA
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
QA	Quality assurance
QAPP	Quality assurance project plan: A plan that describes protocols necessary to achieve the data quality objectives defined for an RI. (See SOPs)
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RRE	Residual Risk Evaluation
SARA	Superfund Amendments and Reauthorization Act of 1986 (See CERCLA)
SDWA	Safe Drinking Water Act
SOPs	Standard operating procedures
SWMU	Solid Waste Management Unit
US EPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Chemical
WHP	Well Head Protection

1. Introduction

Groundwater monitoring is an important part of the environmental monitoring and restoration efforts at the Department of Energy (DOE) Mound Plant. The Department recognizes that past operations have had, and that current operations could have an adverse effect on groundwater near the plant. The Buried Valley Aquifer is the primary source of drinking water for many communities near the plant including Miamisburg and Franklin.

DOE's policy is to conduct its work in an environmentally safe manner, in a manner consistent with federal, state, and local laws, and according to the terms of the Federal Facilities Agreement with U.S. Environmental Protection Agency (US EPA) and Ohio Environmental Protection Agency (OEPA). This program and the procedures herein are the tools necessary to support this policy with respect to groundwater.

The DOE's groundwater monitoring objectives are to:

- assure site workers that their drinking water has not been contaminated by plant activities,
- assure containment of known groundwater contamination,
- monitor and provide early warning of impacts due to continuing operations and decommissioning, and environmental restoration efforts, and to,
- assure local residents and communities that their drinking water has not been contaminated by plant activities.

The groundwater monitoring network near the Mound Plant presently consists of more than 180 wells and piezometers. Environmental investigations will continue to be performed, potential problems will continue to be identified, remediation projects will be conducted, and sites will be proven to be free from contamination. Since conditions will change, this plan provides a methodology to evaluate and modify the Mound Plant groundwater monitoring network if new needs are discovered and as investigations and remedial actions reduce the need for monitoring.

1.1 Site Background

The Mound Plant is a DOE owned, contractor-operated, facility on a 306-acre site in southern Montgomery County in southwestern Ohio (see Figure 1.1). Construction of the Mound Plant began in 1947 and the facility became operational in 1948.

Since 1948, Mound has served as an integrated research, development and production facility in support of DOE weapon and non-weapon programs, especially in chemical explosives and nuclear technology. The plant's principal mission has been to research, develop, and manufacture non-nuclear explosive components for nuclear weapons assembled at other DOE sites. Other major operations conducted at the plant include:

- Manufacture of stable (non-radioactive) isotopes for medical, industrial and general research.
- Development and manufacture of small chemical heat sources for the national defense program.
- Recovery and purification of tritium from scrap materials generated by Mound and other DOE sites.
- Development and fabrication of radioisotopic thermal generators fueled with plutonium^{238} to provide power sources for lunar experiments, satellites and spacecraft.
- Surveillance and testing of explosive and radioactive weapons components received from other DOE sites.

As a result of volatile organic compound contamination discovered in groundwater and a 1969 plutonium waste line break, the Mound Plant was added to the US EPA National Priorities List (NPL) in November 1989. In 1990 the DOE and US EPA signed a Federal Facilities Agreement (FFA) that directs the environmental restoration effort. The Ohio EPA was added to the FFA in July 1993.

1.2 Current Mission

On November 22, 1993, DOE decided to phase out the defense mission at Mound. To lessen the economic hardship on local communities DOE will transfer all remaining facilities and land to commercial use. Activities are currently underway to transfer Mound's defense-related programs to other DOE sites and to shutdown the remaining facilities leaving them in an idle and safe condition for future economic development. Today, some nuclear operations continue as other DOE sites prepare to accept those programs.

The 9-year mission for the Mound Plant is to shutdown operations, remediate land and facilities, and vacate Mound as soon as possible while providing the local communities an opportunity to maintain a strong technical and economic base.

A near term goal is to complete operations and remove all defense-related nuclear materials from the site. After the cessation of nuclear operations at Mound, some facilities will require nuclear decontamination. Some facilities will be demolished.

1.3 Mound 2000

The DOE is using the Mound 2000 process to manage the restoration of the site. In the Mound 2000 process the plant property has been parceled into 19 tracts of land called release blocks (identified A through S), each of which is slated for release from DOE to another party at a specific time. A core team consisting of representatives from DOE, US EPA, and OEPA, reviews the potential release sites (PRS) within the block and determines the appropriate action, if any, required for each PRS. If the cleanup of a potential release site is recommended, and stakeholders concur, the cleanup is conducted as a removal action. The removal action would follow CERCLA guidelines. After all removal actions within a release block are completed, the Core Team evaluates the risks to human health associated with any residual contamination. This evaluation is to ensure that future

users of the land will not be exposed to contamination levels that would pose unacceptable health risks. A Residual Risk Evaluation (RRE) report is prepared for each release block before transfer from DOE to another party. Figure 1.2 shows the nineteen release block boundaries.

Several nuclear decontamination and decommissioning (D&D) and environmental restoration projects are underway. The current major D&D projects include:

- Decontamination and demolition of the SM Building that formerly housed plutonium operations;
- Decontamination and demolition of Building 21 where thorium ore was stored; and
- Decontamination and demolition of portions of R Building and SW Building where many different radionuclides have been handled.

Besides the D&D projects, some land areas require environmental restoration (ER) to eliminate hazards from spilled chemicals and buried contaminated debris. ER activities include testing of potential release sites (PRS) and remediation of sites known to contain hazardous levels of contaminants.

Current remediation activities include:

- Removal of plutonium^{238} contaminated soil from the Miami-Erie Canal;
- Treatment of VOC contaminated groundwater in the Buried Valley Aquifer near the plant's western boundary;
- Removal of actinium and thorium contaminated soil from the disposal site known as Area 7;
- Removal of volatile organic compounds contaminating groundwater near the plant's drinking water production wells; and
- Bioremediation of contaminated soil with petroleum-like chemicals.

The D&D and remediation activities are both being managed via the Mound 2000 process.

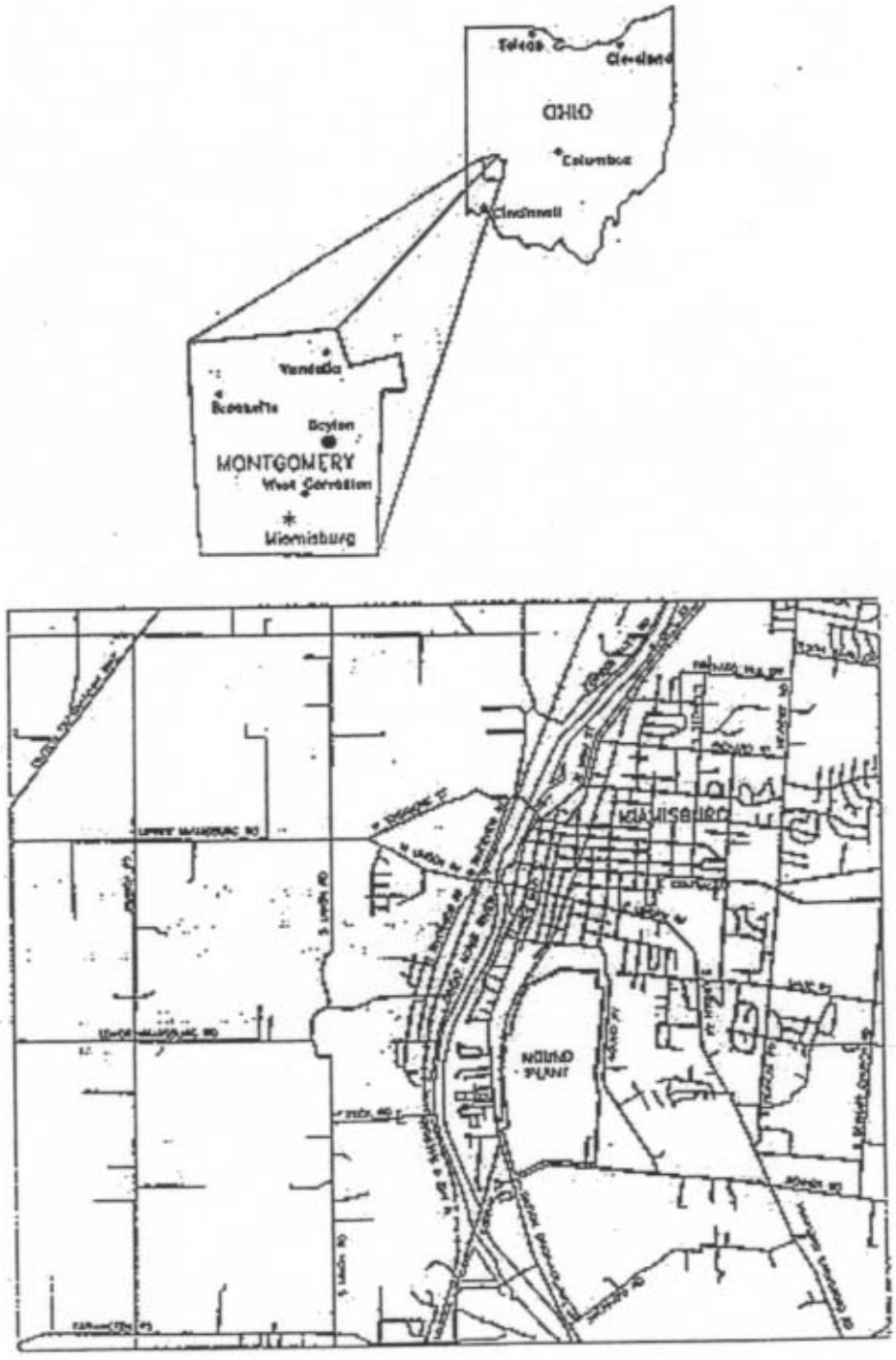

Figure 1.1 Location of the Mound Plant

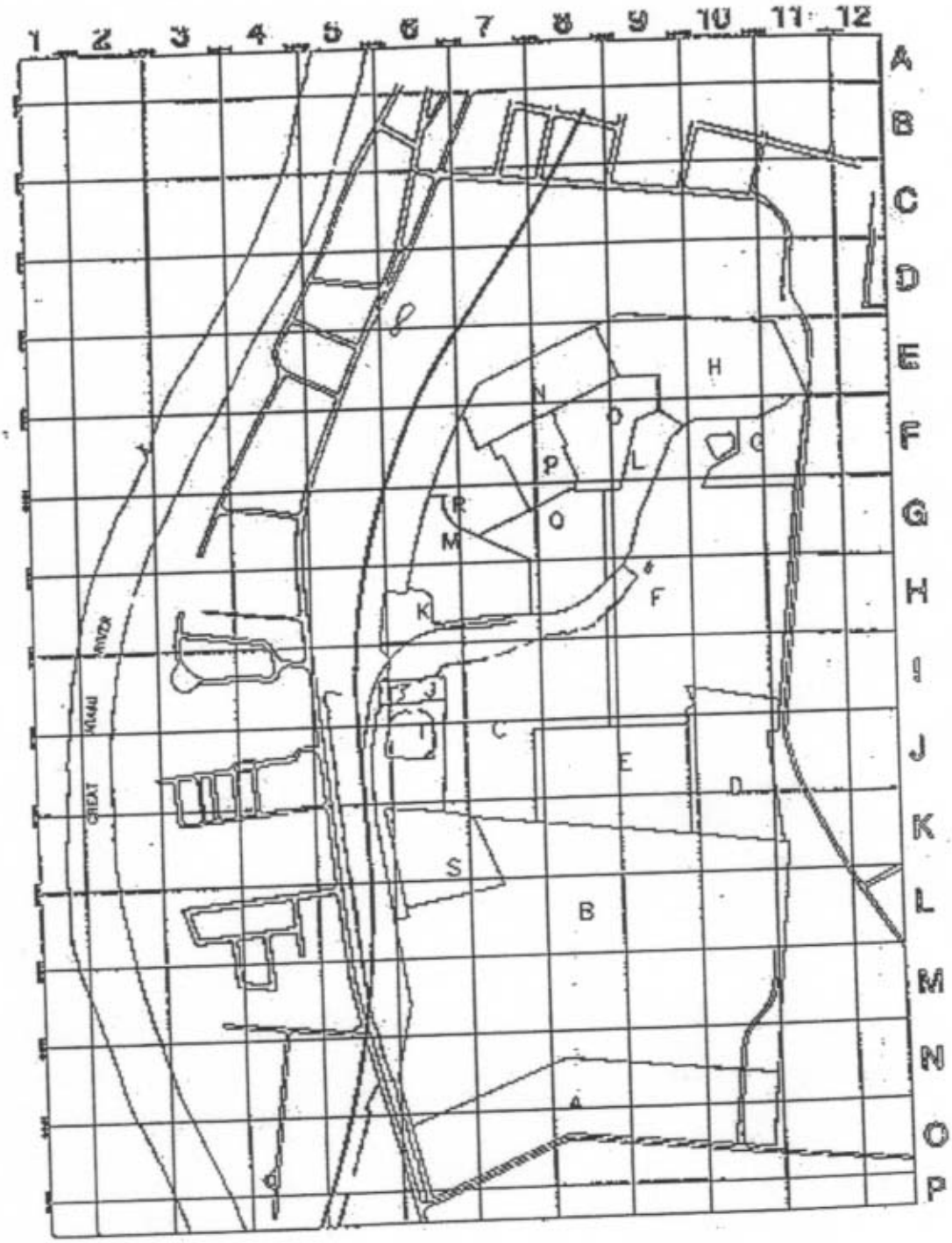

Figure 1.2 Location of Release Blocks

2. Hydrogeology

An understanding of the facility hydrogeology is an important component of groundwater protection. The hydrogeology of the Mound Plant has been studied extensively under the CERCLA process. Results of these investigations are summarized in several technical reports listed in the table below and the reference section.

Table 2.1—Hydrogeology Reports

Document Title	Relevant Information
DOE 1993 Operable Unit 9, Seismic Refraction Survey Report, September 1994 U.S. Department of Energy. July 1993	Provides analytical data to identify bedrock geology for areas sampled in this program.
DOE 1994. Operable Unit 9, Hydrogeologic Investigation: Buried Valley Aquifer Report. U.S. Department of Energy. September 1994.	Establishes characteristics of the geology and groundwater system.
DOE 1994. Determination of Aquifer Diffusivity from River Level Fluctuations near the U.S. DOE Mound Facility in Miamisburg, Ohio, U.S. Department of Energy.	Analyzes the relationship between the Great Miami River and the groundwater system.
DOE 1995. Operable Unit 9 Determination of Potential Pathway from Source Areas Adjacent and within the Buried Valley Aquifer via Ground Water Flow Modeling and Particle Tracking. U.S. Department of Energy. February 1995.	Presents information regarding groundwater flows and directions.
DOE 1995. Operable Unit 9, Hydrogeologic Investigation: Groundwater Sweeps Report. April 1995.	Established background and local groundwater quality.
Infiltration Study of a Portion of the Miami-Erie Canal, Miamisburg, Ohio, August 1996	Examines groundwater recharge rates from the Miami-Erie Canal into the BVA.

The hydrogeologic setting at and near the Mound consists of bedrock ridges and valleys in which the valleys are filled with unconsolidated glacial and alluvial deposits. Two significant hydrogeologic features at the Mound are bedrock highs called the Main and SM/PP hills. Between the two hills is a tributary valley filled with till and outwash. The western extent of the tributary valley is the eastern boundary of the buried valley aquifer that fills the southwest quadrant of the Mound property.

2.1 Bedrock

A detailed study of the bedrock in and near the Mound was conducted under Operable Unit 9 investigations (DOE, 1994). As presented in the Operable Unit 9 Bedrock Investigation, the main hill and SM/PP hill are thick sequences of interbedded shales and limestones that allow groundwater to flow along bedding planes and vertical fractures. Groundwater flow occurs within the fracture carapace that exists from the ground surface to a depth of approximately 50 feet. The fracture carapace is an area that has interconnected secondary porosity. Below this depth very little if any groundwater flow exists. The location of several seeps on the Mound

property shows the boundary between the fracture carapace and impermeable bedrock. Groundwater on the two hills generally flows from the highest elevation toward lower elevations within the fracture carapace.

2.2 Buried Valley Aquifer

Designated as a sole source aquifer by the USEPA, the Buried Valley Aquifer (BVA) is an extensive aquifer system. The aquifer must be protected from contamination due to its extensive use as a drinking water supply. Many investigations of the BVA have been conducted by DOE, and a partial list is included in the references. The BVA enters the Mound property in the southwest quadrant of the property and eventually ends in the east as the bedrock for the main hill and SM/PP hill rises above the elevation of the buried valley aquifer (see figure 2.1). The BVA is broad and flat with a very flat groundwater gradient. Groundwater flow is to the south, except at significant groundwater pumping centers such as the Mound Plant production wells, Miamisburg production wells, Dayton Power & Light production wells (DOE, 1995a). These pumping centers affect the groundwater flow direction and rate.

The Mound production wells produce a capture zone that encompasses the BVA below the Miami-Erie Canal. Several studies have shown that infiltration from the Canal recharges the BVA. This water is then captured by the plant production wells. To allow remediation of the canal, the Mound ER Program rerouted the stream flowing through the south portion of the canal to an on-site enclosed culvert. The reroute also removes a potential source of contamination to the BVA, thereby providing additional protection for the water extracted by the plant production wells.

2.3 Tributary Valley

During the OU-9 Hydrogeologic Investigation a buried gorge was identified on the Mound Plant site. The OU-9 report speculates that this buried gorge enters the Mound Plant northward of well 0395, meanders through the plant beneath the plant drainage ditch, and exits beyond piezometer P026. Glacial outwash deposits and till fill the gorge. Groundwater flow in the tributary valley is west-southwest, to the buried valley aquifer near the Mound NPDES outfall. The tributary valley receives runoff and groundwater from the Main and SM/PP hills.

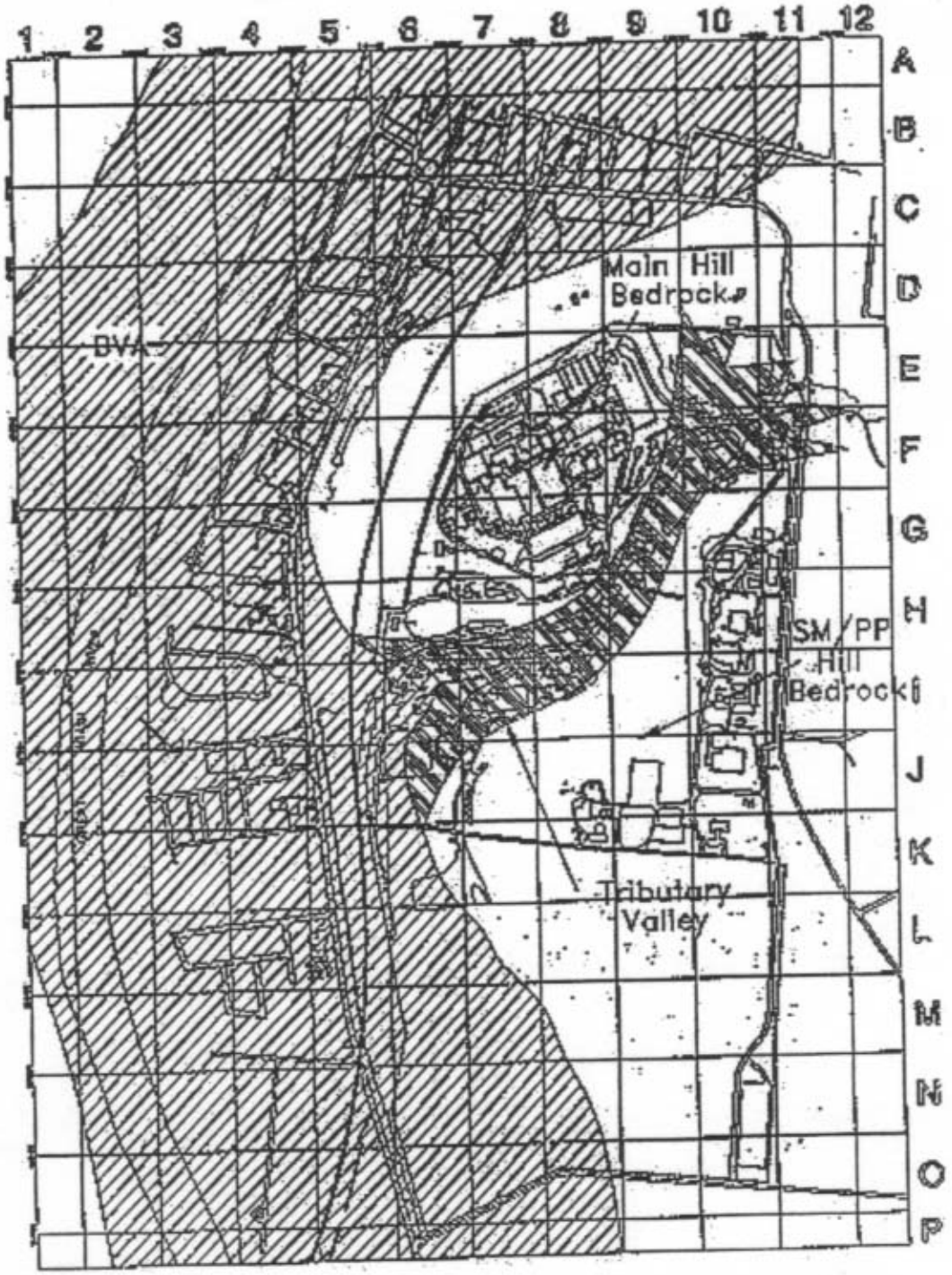

Figure 2.1 Extent of the Buried Valley Aquifer, bedrock and tributary valley.

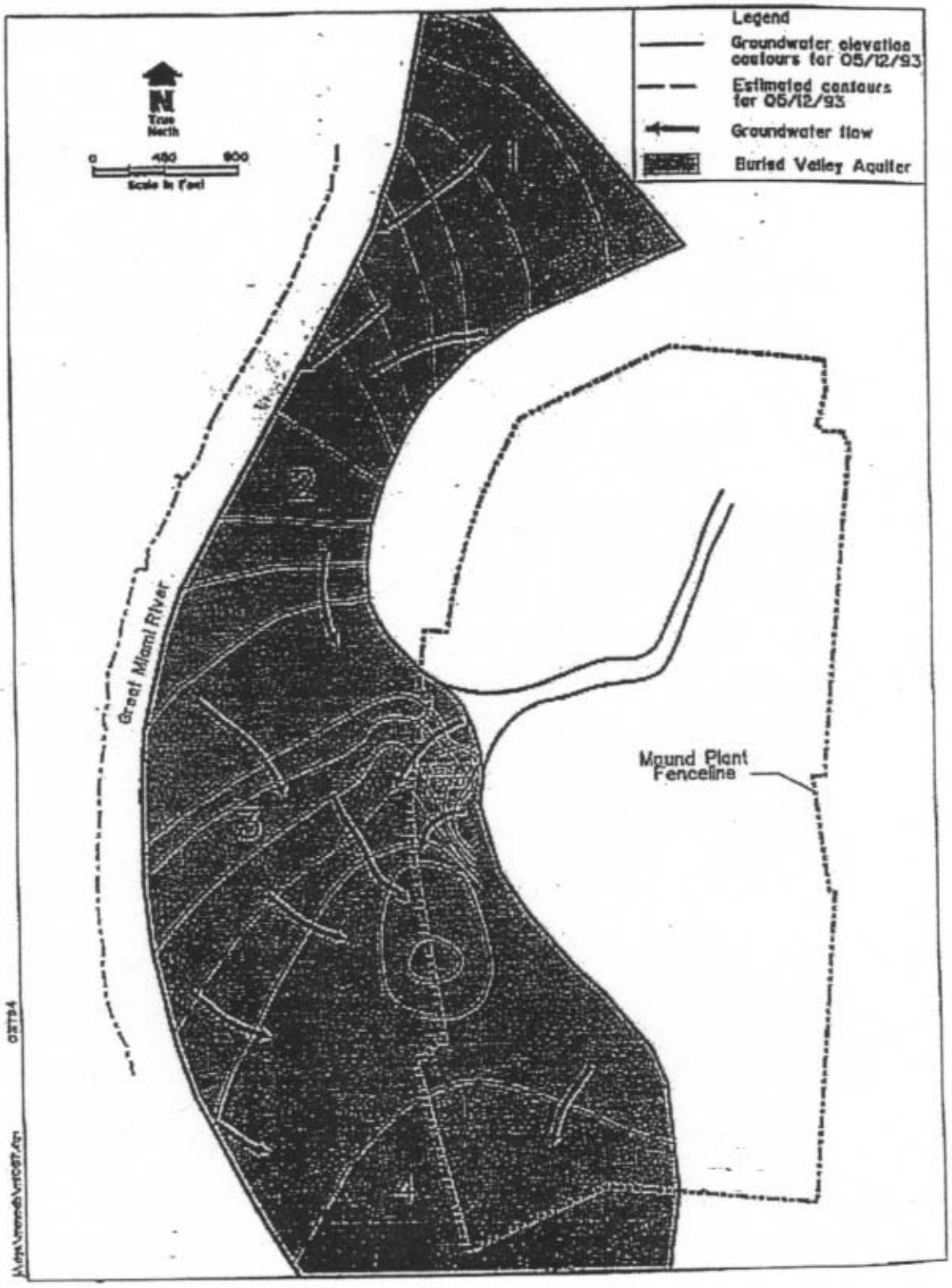

Figure 2.2 Groundwater flow directions near the Mound Plant.

3. Requirements

The groundwater and the use of groundwater at Mound Plant are protected by several federal and state laws and regulations. The regulations that pertain to the Mound site are discussed in this section.

3.1 FFA and CERCLA/SARA

The USEPA placed the Mound site on the National Priorities List (NPL) pursuant to Sections 120 and 105 of CERCLA and SARA in 1989. The USEPA and DOE entered a Federal Facilities Agreement (FFA) (DOE 1990) to:

- ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and that appropriate remedial actions are taken;
- establish a procedural framework and schedule for developing, implementing, maintaining, and monitoring appropriate response actions at the site. A procedural framework and schedule follow CERCLA/SARA and RCRA guidance and policies;
- to facilitate cooperation, exchange of information and participation of the parties;
- identify and execute response actions to be taken at the site; and to
- establish requirements for remedial investigations that determine the nature and extent of the threat to public health, welfare, and the environment.

On July 15, 1993, the FFA became a three-party agreement between DOE, USEPA, and OEPA.

In the FFA, the parties agree

- that CERCLA response activities performed under the FFA will satisfy permit requirements, RCRA corrective action requirements, and state laws; and
- that with respect to releases of hazardous waste RCRA will be considered an applicable or relevant and appropriate requirement (ARAR) as identified in CERCLA.

CERCLA requires that ARARs be considered when determining appropriate responses to releases of hazardous substances. Response is defined by the NCP as remediation or removal. ARARs are not generally applicable to monitoring activities; however, the monitoring presented herein exceeds the monitoring typically required by RCRA.

3.2 RCRA

The Mound Plant is operated under a RCRA Part B permit. Because none of the permitted units require groundwater monitoring, there are no RCRA groundwater monitoring requirements.

3.3 SDWA

The Safe Drinking Water Act (SDWA) was established in 1974 to provide for sanitary drinking water supplies, to protect sole source aquifers, and to establish a program to control underground injection to prevent endangerment of subsurface waters. Under SDWA, EPA has the authority to promulgate primary and secondary drinking water standards for public water supplies enforced by the state. The primary drinking water standards are the maximum contaminant levels (MCL) which are the maximum permissible concentration of a contaminant in water that is delivered to any user of a public water system. MCLs are to protect human health from exposure of contaminated drinking water. The EPA also established non-enforceable maximum contaminant level goals (MCLGs) that are protective of adverse human health effects. Further amendments to SDWA in 1986 established provisions for Wellhead Protection Areas (discussed below).

In Ohio, the Safe Drinking Water Act requirements are enforced by the Ohio Environmental Protection Agency Division of Drinking and Groundwater. The Mound Plant water supply is considered a non-transient, non-community water system because it has fewer than 15 service connections with year round service but regularly serves 25 persons over six months per year (SDWA 40 CFR 141 and OAC 3745-81). These regulations are specific to distributed water derived from surface and groundwater sources. SDWA regulations require regular monitoring at points of distribution for microbiological, inorganic, organic, and radiological constituents known to be detrimental to human health. Specific monitoring requirements such as location, frequency, analysis methods are specified in the regulations and will be followed in this plan.

3.4 Ohio Wellhead Protection Program

The federal SDWA Amendments of 1986 mandate that each state develops a wellhead protection program to protect public water supplies that utilize a groundwater source. Federal guidelines were developed by USEPA with the intent of program development to meet the individual state's needs. The OEPA is the authorizing agency for completing this mandate in Ohio.

The OEPA presented a comprehensive bill to the Ohio legislature in May 1990 for implementation of a Wellhead Protection Program (WHP) but the legislation failed to pass. This program is being implemented across the state, voluntarily, by public water purveyors. Mound Plant voluntarily implements portions of the Ohio Well Head Protection program.

The WHP program as proposed to the legislature contains six key elements:

I. Delineate the WHP area using the method most applicable to the type, setting and resources of the public water system.

II. Identify potential pollution sources by determining past, present, and proposed land use activities in and around the WHP area.

III. Develop management strategies that initiate policies and procedures to prevent contamination of present or proposed water supplies from the identified potential sources.

IV. Develop a groundwater monitoring plan that will adequately determine the need for monitoring and will provide early warning if implemented.

V. Develop or modify contingency plans for emergency response and identify alternate short and long-term water sources.

VI. Develop public involvement/education program to inform and allow participation by the public in planning efforts.

Most elements of a WHP are covered by this plan. However, with respect to items I, II, and III off-site potential sources that could be captured by Mound production wells have not been evaluated. The monitoring plans presented in this document address elements III and IV with respect to sources from the Mound Plant. The fifth element, the identification of alternate short and long term water sources, is an important element and should be addressed by the planning required for economic redevelopment of the Mound Plant. Element VI is also addressed by the ER process. CERCLA newsletters and public meetings address the process of educating and informing the public to the process of CERCLA and the status of the ER Program at Mound. As portions of the Mound Plant are transferred for commercial development, it will become the responsibility of the major landowner to ensure that the well head protection is fulfilled.

3.5 Ohio Administrative Code

Some Federal environmental laws such as RCRA and SDWA delegate day to day compliance and enforcement actions up to state environmental agencies. In following the federal laws, states can adopt federal laws directly or establish their own stricter laws. Ohio EPA regulations established in the Ohio Administrative Code (OAC) are based upon compliance and enforcement of the federal laws with some stricter state variations. Regulations related to groundwater monitoring are found throughout OAC Chapter 3745.

3.6 DOE Order 5400.1

DOE Order 5400.1 requires DOE facilities to comply with all applicable federal, state and local environmental protection laws and regulations. The order is proposed to become law under 10 CFR 835. It also requires the site to develop and implement an Environmental Monitoring Plan (EMP) for effluent monitoring, meteorological monitoring, and environmental surveillance. Guidelines are also established for laboratory procedures, dose calculations, reporting, quality assurance, data management, analysis, and statistical treatment. Effluent monitoring (discharges into any environmental compartment) and surveillance monitoring of off-site locations to allow early contaminant detection are groundwater subtasks. In

1996, the EMP was revised, re-establishing guidelines for effluent, meteorological, and environmental surveillance monitoring. Groundwater protection monitoring is part of this overall site-wide monitoring program. The program outlined in the following section presents the detailed plans for groundwater protection monitoring and surveillance monitoring required by the order.

4. Monitoring Program

Groundwater monitoring at the Mound Plant needs to satisfy all applicable regulations pertaining to the use, protection, and clean up of groundwater. This program's purpose is to provide monitoring that is compliant with the regulations and meets the plants long-term needs.

When considering the regulations in Section 3, the groundwater monitoring requirements for the site are driven by the Federal Facilities Agreement, the SDWA, and the Ohio Administrative Code. In addition, the Mound Plant presently conducts supplemental monitoring which is not specifically mandated by regulation but is considered useful.

Plate 1 is a map of monitoring locations discussed in the following sections.

4.1 SDWA Monitoring

SDWA regulations require regular monitoring of drinking water for microbiological, inorganic, organic, and radiological constituents known to be detrimental to human health. Drinking water monitoring requirements are implemented over a three year period of time known as a Compliance Period. Three compliance periods make-up a compliance cycle. Based on these time frames, the OEPA Drinking and Ground Water Division issued the monitoring requirements stated in OAC 3745-81 for the Mound Plant. OEPA has designated the Mound Plant water system as a non-transient, non-community, public water system.

During the course of a compliance period, monitoring requirements can be decreased if a constituent is detected but is reliably and consistently below the Maximum Contaminant Level. In 1994, the OEPA notified Mound Plant that monitoring for VOCs could be reduced from quarterly to annually. However, the Mound Plant considered it to be more prudent to continue quarterly monitoring considering the proximity of the productions wells to the OU1 historic landfill.

The regulations dictate the requirements including the analytes to be monitored, the monitoring frequency, the analytical methods, the maximum permissible levels, and reporting. The analytical methods are presented in Table 4.1 and other requirements are listed in Table 4.2.

The Safe Drinking Water Act specifies the maximum contaminant levels (MCLs) permitted in drinking water. Table 4.2 also lists the actions that must be taken if the MCLs are exceeded.

If an MCL is exceeded, plant personnel will be notified of potential health risks and an accelerated monitoring schedule would be implemented. Quarterly monitoring is the only requirement if constituents are detected

with concentrations below MCLs, and this is the present situation for VOCs. OEPA can waive quarterly monitoring requirements if no constituents are detected. This was the case with respect to synthetic organic compounds in 1994 and 1996.

Table 4.1. SDWA Monitoring Parameters and Analytical Methods

Parameter	Analytical Method
Microbiological	EPA 909A
Inorganic	Standard methods EMSL91, EMSL83, AND EMSL
Nitrate	Standard Methods, EMSL83, EMSL
Volatile Organic Compounds (VOC)	EPA 524.1
Synthetic Organic Compounds (SOC)	EPA 504, 505, 506, 508A, 515.1, 547
Gross Alpha & Beta	EPA 302
Tritium	EPA 306

Standard Methods - Standard Methods for the Examination of Water and Wastewater 17th Edition, EMSL91 - Methods for the Determination of Metals in Environmental Samples, EPA/600/4-91/010, EMSL83 – Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised 1983, EMSL - Determination of Inorganic Ions in Water by Ion Chromatography, EPA/600/R-93/025

Regulations require that the public water system be sampled from each entry point to the distribution system after any application of treatment. Treatment consisting of softening, disinfecting by chlorination, and adding corrosion inhibitors occurs at the Powerhouse and Building 24. Sampling is conducted at distribution points D01 and D02, located in the Powerhouse and Building 24 respectively.

As a best management practice, samples are collected from the production wells at points PW1, PW2, and PW3 (denoted as wells 0071, 0076, 0271 in ER program documents) according to the monitoring schedule in Table 4.2. This practice provides practical water quality data that can be used in case of a pump failure or any other emergency.

The historical landfill, in Release Block I, also affects what wells are used and their pumping duration. The OAC requires that if each source of water cannot be represented during a sampling period, then successive samples shall be taken in the following sampling periods until all the sources that supply water have been monitored (OAC 3745-81-24 B-2). Mound production wells PW2 and PW3 are rotated quarterly in order to comply with this regulation. However, production well PW1 (PW1, 0071) is used only in emergencies as pumping for prolonged periods causes an increase in VOC concentrations. When in operation, production well PW1 is sampled weekly for VOCs in order to guard against exceeding the MCLs. The OEPA concurred with this strategy during the 1994 survey of the water system.

4.2 Supplemental Monitoring

To assure that the plant is operated in a manner protective of groundwater, Mound has typically conducted groundwater monitoring beyond that required by the regulations. For many years, supplemental monitoring has been performed at several wells, trenches, seeps, both on-site and off-site. This data serves a variety of purposes. The specifics of this monitoring are discussed below.

Supplemental monitoring is discretionary and not mandated by regulation. Thus, this portion of the plan is subject to budgetary pressure and may be affected if funding were insufficient.

4.2.1 Monitoring for Community Assurance

Groundwater sampling has been historically conducted at off-site wells to provide assurance to local communities and to document long-term trends of radionuclide concentrations. The plan presented in Table 4.3 includes the monitoring of:

- seven local communities' water supply for tritium,
- tritium concentrations in wells downgradient (i.e. west of Mound Plant) of the Mound Plant,
- plutonium and uranium concentrations downgradient of the plant

Table 4.3 identifies wells selected for off-site supplemental monitoring. These wells are selected either to provide early warning of potential contamination or to monitor existing plume. The selected wells could be changed upon evaluation of data. Results for these wells will be compared to MCL and background concentrations for the Buried Valley Aquifer and bedrock. The background values for the BVA were determined by the OU-9 Hydrogeologic Investigation: Groundwater Sweeps Report (April 1995). If a significant change in groundwater quality is verified, US EPA, OEPA and affected property owners will be notified.

4.2.2 Monitoring Containment of Known Contamination

Other locations are monitored to assure that known groundwater contamination is contained and not migrating towards points of use. The nearest point of use is the Mound Plant production wells that supply drinking water for the plant. These production wells pump a large amount of water, and consequently, groundwater flows toward them.

Table 4.2 SDWA Monitoring Requirements

Sample Location	Test Parameter	Sampling Frequency	Compliance Parameter	Reporting Time	Non-Compliance Action
Plant taps in Buildings 102 and OSE	Micro-biological	2 Samples per month	1 Positive per 100 mL	Close of next business day	Set of 4 replicate samples for each positive within 24 hours
Production wells PW1, PW2, PW3 and distribution system locations D01 and D02	Inorganics	Every 3 years (1997)	MCL for the distribution system	48 hours	Confirmation sample within 2 weeks
	Nitrate	Annually	50% of MCL for distribution system	48 hours	Quarterly monitoring
			Exceed MCL for distribution system	48 hours	Confirmation sample within 24 hours
	VOCs	Quarterly	MCL for the distribution system	48 hours	Implement best available treatment; OU-1 P&T or provide alternative source of water
	Synthetic Organic Chemicals	Once every 3 years (1997)	MCL for the distribution system	48 hours	Quarterly monitoring
	Gross Alpha	Quarterly	>5 pCi/L	48 hours	Resample within 2 weeks for Radium 226/228
			>15 pCi/L	48 hours	Conduct non-compliance action
	Gross Beta	Quarterly	50 pCi/L	48 hours	Identify major radiological constituents in the sample; Conduct non-compliance action
	Tritium	Quarterly	20 nCi/L	48 hours	Conduct non-compliance action
Pre-1987 buildings with copper pipes and lead-based solder	Lead Copper	Ten samples annually	15 ug/L 1300 ug/L	Within 10 days of monitoring	Implement or evaluate corrosion control program; twenty samples every 6 months
Pre-1983 buildings with copper pipes and lead-based solder	Lead Copper	Ten samples annually	15 ug/L 1300 ug/L	Within 10 days of monitoring	Implement or evaluate corrosion control program; twenty samples every 6 months

The Mound ER Program, under Operable Unit 1 (OU1), is remediating VOC contaminated groundwater at the historic site sanitary landfill. The remediation efforts are designed to remove VOCs leaching into the groundwater and stop migration toward the plant's production wells.

Under OU1, a network of wells is monitored to determine the effectiveness of the remediation process. However, to assure the safety of the plant drinking water supply, Ohio EPA has requested that four monitoring wells be checked quarterly for volatile organics to provide early warning of migration towards drinking water sources. The monitoring locations chosen for this are P015, P025, P027, P031, 0317, and 0410. If the VOC concentration increases at these locations, the corrective action will examine alternate sources of water with an additional well as the most probable solution.

Two additional areas of contaminated groundwater have been identified. The first exists just north and upgradient of the present OU1 site. Samples from wells 0315, 0347, 0386, and 0389 contain trichoroethene (TCE) results slightly above the MCL of 5 ug/L. The second area is indicated by similar TCE results near well 411. Samples from both areas also indicate concentrations of selected metals above MCLs. Nested well pairs 0386/0389 and 0387/0392 and well bedrock well 0411 are selected to monitor these areas. A separate investigation is planned to determine the sources of these problems.

4.2.3 Monitoring for Early Warning

Monitoring at certain locations also serves as an early warning of groundwater problems. Because of past and continuing plant operations, decommissioning and remediation projects there is still reason to study and monitor for groundwater contamination on the plant site.

Previously, the Mound ER Program established that the Main Hill and SM/PP Hill has a fractured bedrock carapace. Groundwater flow is diverted laterally through the shallower more conductive portions of the carapace until it emerges at several hillside seeps. In the early 1980s, nine trenches were dug to intercept groundwater movement from potential sources of contamination. They were backfilled with pea size gravel and sloped toward a PVC monitoring well for collection of groundwater samples. In addition to the trenches and seeps, several monitoring wells are positioned to monitor groundwater flowing from the Main hill and the SM/PP hill into the tributary valley.

Some locations are sampled because they have been sampled for many years and provide a baseline. The baseline is necessary to understand current results and to assess whether groundwater quality is improving or degrading. A significant change in trend is a signal that some process change has occurred. If the change is adverse, operating practices will be reviewed in attempt to determine and correct the cause.

Locations selected for early warning monitoring and flow regime monitoring are listed in Table IV.3.

Results of supplemental monitoring will be analyzed for trends after each sampling event. Summaries of results will be included in the Mound Annual Site Environmental Report.

4.3 Sampling Program and Procedures

Implementation of this plan involves the collection, compilation and analysis of data. Methods and procedures are in place that provide the necessary quality level or quality objectives. These methods and procedures are divided into five groups; field standard operating procedures, field methods, analytical methods, quality assurance methods, and data validation methods.

Table IV.3. Summary of Supplemental Groundwater Monitoring Program

Objective	Parameters	Sample Location	Sampling Frequency
Community Assurance	Tritium	Community water supplies: Franklin, Germantown, Miamisburg, Middletown, Springboro, West Carrollton, Tipp City	Monthly
		Monitoring wells off-site 0127, 0128, 0129, 0303, 0376, 0377, 0383	Quarterly
		Private wells 0940, 0905, 0906, 0907, 0909, 0912	Monthly Seasonally
	Isotopic Plutonium, Uranium	Miamisburg, Tipp City	Monthly
	Isotopic Plutonium, Uranium, and Thorium	Monitoring wells off-site 0129, 0303, 0376, 0377, 0383	Semi-Annually
Early Warning	VOCs, TAL Metals and Tritium	On-site 0353, 0379, 0382, 0712, 0713, 0714, 0726, 0727	Semi-Annually
	VOCs, TAL Metals, Tritium, Isotopic, Plutonium, Uranium, Thorium, Radium	Monitoring wells on-site 0111, 0119, 0125, 0314, 0345, 0346, 0395	Semi-Annually
	Tritium	Monitoring well trenches on -site 0712, 0713, 0714, 0725, 0726, 0727, Seeps 0601, 0607	Weekly
Assure Containment	VOCs, TAL Metals and Tritium	Monitoring wells off-site 0123, 0129, 0158, 0302, 0303, 0343, 0376, 0377, 0378, 0383, 0389, 0392	Annually
Assure Containment near plant drinking water supply	VOCs	P015, P025, P027, P031, 0317, 0410	Quarterly
Site-worker Assurance	Tritium and Isotopic Plutonium, Uranium, Thorium	On-site production wells 0071, 0271, 0076	T: weekly Pu,U: mthly Th: qrtly

Table 4.4. References to documented procedures

GMP Monitoring	Analytical Methods	QA Methods	Data Validation and Reporting	SOP Reference
SDWA	Regulation Dictated	MD-80033	MD-80030	MD-80030
Community Assurance	MD-80030	MD-80033	MD-80030	MD-80030
Early Warning	MD-80030 and Methods Compendium	MD-80033 and Methods Compendium	MD-80030 and Methods Compendium	MD-80030 and Methods Compendium
Assure Containment	MD-80030 and Methods Compendium	MD-80033 and Methods Compendium	MD-80030 and Methods Compendium	MD-80030 and Methods Compendium
Site-worker Assurance	MD-80030	MD-80033	MD-80030	MD-80030

ET&M = Environmental Technology and Monitoring

The sampling and analysis procedures are described by the OU9 QAPP (DOE 1995), the Methods Compendium (DOE 1996), and procedures cited in manual MD-80030 (EG&G 1996). Safe Drinking Water Act sampling and reporting is performed in accordance with manual MD-80030 and the state regulations. Table 4.4 lists the procedures that will be followed.

The sampling procedures are listed in the OU-9 QAPP Appendix A, the ER Methods Compendium, and in MD-80030. A partial listing of relevant SOPs are listed in Table 4.5. The sampling procedures identify field measurements and information to be recorded.

4.3.1 Sample Identification

To facilitate electronic storage of data to the ER Program database, the following sample numbering system will be used. An identifier of the form GMP-ZZZZ-T-WWWW-YRXXXX will be used to incorporate data into Mound Environmental Information Management System (MEIMS) where:

GMP - Groundwater Monitoring Program
ZZZZ - SDWA for Safe Drinking Water samples
SUPP for supplemental
(Special projects may have other ZZZZ designations.)
T: 0 = no QC sample
1 = field duplicate
2 = trip blank
3 = matrix spike
4 = matrix spike/laboratory duplicate
WWWW - Location ID
YR - Two digit year representation – 97, 98, etc.
XXXX - Unique sequential four digit sampler identifier to be used on the laboratory chain-of-custody
Example: GMP-SDWA-0-0387-970001

4.3.2 Quality Control Samples

Field quality control (QC) samples should be collected in proportion to the number and type of samples required. As a general guide, Table 4.6 summarizes typical QC requirements for each of the Mound sampling program types as a number of QC samples per the total number of samples collected during any given sampling event.

4.3.3 Analytical and Field Methods

Different analytical methods are applied to the samples collected. Table 4.7 is a list of the monitoring type, parameter(s) and the associated analytical methods. The SDWA requirements were extracted from the OAC 3745-81-24 and 27. Supplemental monitoring analytical methods were chosen based on the monitoring objectives and desired detection limits and established procedures.

Field methods will be used when there are less stringent data reporting requirements or fast turn around time is needed provided the field method is capable of meeting the designated data quality objective. Analysis of SDWA samples must be completed by a state certified laboratory. Radiological analysis for isotopic uranium, plutonium and thorium; gamma spectrometry and tritium will be performed by procedures listed in the ER Methods Compendium and MD-80030.

4.3.4 Data Validation and Reporting Methods

4.3.4.1 Reporting Laboratory Data

Contract laboratories have several "tiers" of analytical results reporting. The tiers range from I to III. A Tier I report usually contains the parameter name and associated value or a less than detection limit value, method blank results, and laboratory control standard results. Tier II contains Tier I reporting and the dates analyzed to enable evaluation of hold time compliance. Tier III is required by the EPA Contract Laboratory Program (CLP). It contains Tier II plus matrix spike recoveries, run sequence logs, calibration data, instrument checks, chromatograms and instrument printouts, a narrative describing the results and any anomalies during analysis, and CLP standard forms.

Laboratory reports for Supplemental and SDWA monitoring will be Tier II. Groundwater data collected during special ER Program investigation could be reported at Tier I, II or III depending on the specific needs (see Methods Compendium, Methods Q-005, Q-014).

4.3.4.2 Data Review and Validation

A review of analytical results will be conducted by the Mound ER Program. Because periodic groundwater monitoring establishes a trend, expected results can be determined in advance of receiving laboratory results. If an analytical result deviates from the expected trend then further review and, possibly full validation, of the laboratory report is required. If full validation is deemed necessary, it will be conducted and documented per

the procedures in the Methods Compendium. Validation results will be incorporated into the MEIMS database.

4.3.4.3 Data Management and Reporting

Except for SDWA results, data collected will be entered into the Mound Environmental Information Management System (MEIMS). The data can then be retrieved and used to conduct trend or other analyses. Ohio EPA requires that SDWA results be reported on standard forms 5019, 5020, and 5022. Therefore, these results will be managed separately.

Statistical control charts will be used on selected wells and key analytes to evaluate data trends against the baseline. These charts will be updated and evaluated after each sampling event. A summary will be presented at FFA and AIP meetings as appropriate or upon request.

The results of the Groundwater Monitoring Program will be formally reported in the annual Mound Site Environmental Report.

Table 4.5. Standard Operating Procedures from the OU9 QAPP Pertinent to Groundwater Sampling

SOP	Task	Purpose
Section 1 – General		
1.1	General Instructions for Field Personnel	To provide field personnel with instructions regarding activities to be performed before, during, and after field investigations.
1.3	Sample Control and Documentation	To define the steps necessary for sample control and identification, data recording, and chain-of-custody documentation.
1.4	Sample Containers and Preservation	To provide guidance in the selection of suitable containers for samples, container cleaning, required sample volumes, sample collection, holding times, and the recommended preservation techniques for water, wastes, sediments, sludges and soil samples.
1.5	Guide to Handling, Packaging, and Shipping Samples	To provide a general guide for packaging and shipping samples of environmental and hazardous materials to the laboratory. In addition, instructions are provided to select the correct category for packaging and shipping samples of unknown contents.
1.6	General Equipment Decontamination	To describe methods for the decontamination of field equipment potentially contaminated during sample collection.
1.8	Personnel Decontamination Level D Protection	To describe the equipment and procedures required for the decontamination of persons who have performed field activities in Level D protective clothing.
1.15	Guide to Waste Management	To provide general guidance and specific procedures for the management of investigation-derived material (IDM) at the Mound Plant.
Section 2 Water Sampling		
2.1	Presample Purging of Wells	To identify well-purging procedures for evacuation of stagnant water from the well bore and its replacement by groundwater in sufficient quantities so that a water sample representative of the formation of completion can be collected.
2.2	Field Measurements on Ground and Surface Water Samples	To obtain reliable and accurate measurements of the field chemistry (pH, temperature, electrical conductivity, alkalinity, dissolved oxygen, redox potential) of water quality samples. It should be noted that dissolved oxygen is not routinely measured as part of groundwater monitoring. Refer to the Field Sampling Plan (FSP) or Work Plan (WP) for details on the measurements to be performed.
2.3	Sampling Monitoring Wells with a Bladder Pump	To use a bladder pump to obtain representative groundwater samples at shallow depths that are beyond the capabilities of a peristaltic pump.
2.4	Sampling Monitoring Wells with a Bucket-Type Bailer	To obtain a representative groundwater sample at depths beyond the range (or capability) of suction lift pumps when volatile air stripping is of concern, well-casing diameters are too narrow to accept submersible pumps, or other difficult conditions are present.
2.5	Sampling Monitoring Wells with a Submersible Pump	To obtain a representative sample of the groundwater at depths beyond the capabilities of peristaltic pumps when bailing and bladder pump is ineffective.
2.6	Sampling Monitoring Wells with a Peristaltic Pump	To collect a representative sample of the groundwater from a shallow well (less than 20 feet deep).
2.7	Sampling Commercial, Municipal, Domestic Wells	To define guidelines for field personnel to follow in sampling commercial, municipal, and domestic wells.
2.8	Sampling for Volatile Organics	To outline procedures for collecting a representative groundwater sample and transporting it from its original environmental to the laboratory for analysis of trace volatile organics.
Section 3 Hydraulic Testing		
3.1	Water Level Measurement	To determine the depth-to-water in an open borehole, cased borehole, monitoring well, or piezometer.

SOP Numbers from OU-9 QAPP April 1995
Some SOPs may not apply to all monitoring events.

Table 4.6. Typical Groundwater Sampling Quality Control Requirements

Objective	Duplicates	Trip Blanks	Matrix Spikes	Rinsate
SDWA Monitoring	1 per 10 samples[a]	None	None	None
Supplemental – Community Assurance	1 less than the collection	None	None	None
Supplemental - Flow Regime Monitoring	1 per 10 samples	1 per shipping package containing VOCs	1 per 20 samples sent to offsite lab	1 per 20 samples collected with non-dedicated equipment
Supplemental - Early Warning	1 per 10 samples	1 per shipping package containing VOC samples	1 per 20 samples sent to offsite lab	1 per 20 samples collected with non-dedicated equipment
Supplemental - Assure Containment	1 per 10 samples	1 per shipping package containing VOC samples	1 per 20 samples sent to offsite lab	1 per 20 samples collected with non-dedicated equipment
Supplemental Assure Containment near Plant Drinking Water Supply	1 per 10 samples	1 per shipping package containing VOC samples	1 per 20 samples sent to offsite lab	1 per 20 samples collected with non-dedicated equipment

[a] Duplicates for SDWA monitoring are done as a best management practice and are not mandated.

Table 4.7. Parameters and Analytical Methods for Supplemental Monitoring

Parameter	Analytical Method
Volatile Organic	ER MC A-002
TAL Metals	ER MC A-005
Tritium	ER MC F-004 / MD-80030 OP 2261
Plutonium	ER MC F-001 / MD-80030 OP 1272
Uranium	ER MC F-001 / MD-80030 OP 3266
Thorium	ER MC F-001 / MD-80030

ER MC – Environmental Restoration Methods Compendium

5. Special Projects

Groundwater monitoring may be required by special projects such as Operable Unit 1, Environmental Restoration short-term investigations, Potential Release Site investigations and RCRA closures.

The Mound Environmental Restoration Program is required through the Federal Facilities Agreement to identify, investigate and, if necessary, remediate all potential historic sources of releases of contamination. DOE, USEPA and OEPA have developed the Mound 2000 process to expedite this work. In the process, all available information for each potential release site is evaluated by a "Core Team" consisting of representatives from DOE, USEPA and OEPA. They determine the appropriate action required for each PRS, if any. Some PRSs will require further investigation including possible groundwater studies.

Generally, specific ER Program investigations will take the form of a project. They will have a specific goal and a defined timetable. The work will be defined by unique sampling plans, and the results reported separately. Ultimately, however, all of the data is entered into the Mound Environmental Information Management System.

5.1 Operable Unit 1

Operable Unit 1 is a four-acre site characterized by low level chlorinated solvent contamination in soil and groundwater. The contaminated groundwater is in a shallow, highly permeable, sandy-gravel, sole source aquifer that provides drinking water for the Mound Plant and cities along the Miami River. The contaminated soil above the aquifer holds the same contaminants, generally in the range of 100 parts per billion, but in some areas as high as 25 parts per million.

Presently the ER Program is installing a system to remediate VOCs present in Operable Unit 1. Remediation is complicated by a historic landfill that overlays a portion of the site. Remediation will stop migration toward the Mound Plant production wells and eliminate exposure to VOCs.

The ER Program monitors several wells to determine the effectiveness of the remediation process. Based on an agreement between DOE and Ohio EPA the following OU1 wells are monitored for VOCs on a quarterly basis.

P015, P025, P027, P031, 0317, 0410, P043, P044, P045, P046, 0305, 0308, 0313, 0370, 0373, 0397, 0415, 0416, 0417, 0418, 0419, 0420, 0421, 0422, 0423, 0424, 0425

Locations P015, P025, P027, P031, 0317, and 0410 are also being monitored to meet objectives in the supplemental portion of the monitoring program.

6. Well Installation and Abandonment

For the past twenty years there has been much groundwater monitoring conducted at the Mound Plant. As a result, in August 1996 there was a network of 184 monitoring wells (including piezometers). These wells have been installed for a variety of reasons and not all of these wells are required for monitoring. Each well is an environmental liability because of the direct conduit to groundwater resources. Although the wells are secured, there is potential for vandalism. In this plan and in future revisions of this plan, each well will be evaluated to determine whether the monitoring well is useful for future monitoring. Wells that are not useful will be abandoned.

6.1 Monitoring Network Evaluation

The current network was evaluated using the stepwise procedure below. A list of all wells evaluated and the future use criteria are presented in Appendix A. Plate 3 is a map of the complete Mound Groundwater Monitoring Network.

Step I - Determining Usable Wells and Piezometers

Each well and piezometer in the existing monitoring network is evaluated against the following criteria. If the monitoring well fails two of the three conditions the well is not suitable for future use and is marked for abandonment.

- Is the monitoring well constructed as per USEPA Technical Enforcement Guidance Document guidelines for monitoring well standards?
- Does the monitoring well provide water quality samples and measurements that are representative of the aquifer it is monitoring?
- Have the original objectives of the monitoring well been achieved?

Step II - Monitoring Location Evaluation Criteria

The monitoring locations that passed Step I are evaluated for their usefulness in meeting SDWA monitoring requirements or supplemental monitoring goals. The following criteria were used.

- Is the monitoring location hydrogeologically upgradient of the Mound Plant and in the BVA - a suitable background location?
- Is the monitoring location hydrogeologically down gradient of the Mound Plant in the BVA and near the CERCLA OU1 compliance boundary?
- Is the monitoring location within the Main Hill or the SMPP Hill bedrock hydrogeologic regime a supplemental assessment need?
- Does the monitoring location have either an extensive historical water quality and water level database or was (is) it used for compliance or supplemental monitoring?
- Does the monitoring location have water quality constituents that are greater than background or organic concentrations that have shown an increasing trend that requires supplemental evaluation?

Step III - Evaluating Monitoring Locations for Other Potential Uses

Monitoring locations that are on-site and are not required to meet the objectives above (Step II) are evaluated by the following criteria.

- Is the monitoring location either near a PRS or within a PRS that requires further monitoring to assess the PRS status?
- Does the monitoring location have existing groundwater quality anomalies?
- Is the monitoring location within an area that could assess the OU-1 remediation effectiveness?

If these criteria failed the monitoring well is not needed and may be abandoned.

6.2 Results of Well Evaluation

After applying the procedure above, fifty-six wells were not required for this plan and could be abandoned. These wells are shown on Plate 2. The evaluation is summarized in Appendix A.

6.3 Well Abandonment

Wells will be abandoned using the Site-Wide Well Decommissioning and Abandonment Program Plan (DOE, 1992). Each closure will be documented as the plan describes.

Each well closure will be planned taking into account the unique physical conditions that exist at the well. After completion of all work in a Release Block, the usefulness of wells in and around that Block will be evaluated and abandoned if appropriate.

After abandonment, an Ohio Department of Natural Resources, Division of Water, Water Well Sealing report will be completed and sent to ODNR.

6.4 Well Installation

In 1996, several wells were removed from the plant western boundary to support the Miami-Erie Canal remediation. Wells 0420, 0421, 0422, 0423, 0424, and 0425 and piezometers P043, P044, P045, and P046 were installed to replace those removed. Monitoring plans have not been finalized for these wells.

Well installation, when required, will follow established ER SOPs.

7. References

DOE 1990. "Federal Facilities Agreement." U.S. Department of Energy and U.S. Environmental Protection Agency Region V. 1990.

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DOE 1996. "Mound Integrated Comprehensive Plan DOE Exit Plan." July 23, 1996.

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EG&G 1996 "Environmental Analytical Procedures." Mound Technical Manual # MD 80030. EG&G Mound Applied Technologies.

DOE 1996. "Infiltration Study of a Portion of the Miami-Erie Canal, Miamisburg, Ohio," U.S. Department of Energy.

Attachment 1

Excel Spreadsheet of Monitoring Objectives, Parameters and Schedule

SUPPLEMENTAL GROUNDWATER MONITORING PLAN	OBJECTIVE					SAMPLING PARAMETERS AND SCHEDULE							
	Community Assurance	Early Warning	Assure Containment	Site-Worker Assurance	OU1 Effectiveness	Volatile Organic Compounds (VOCs)	TAL Metals	Tritium	Nitrate/Nitrite	Nitrite	Isotopic Plutonium	Thorium	Uranium
On-Site Monitoring Wells													
0111		●				S	S	S			S	S	S
0119		●				S	S	S			S	S	S
0125		●				S	S	S			S	S	S
0305					●	Q							
0306					●	Q							
0313					●	Q							
0314		●				S	S	S			S	S	S
0317			●		●	Q							
0345		●				S	S	S			S	S	S
0346		●				S	S	S			S	S	S
0353		●				S	S	S					
0370					●	Q							
0373					●	Q							
0379		●				S	S	S					
0382		●				S	S	S					
0395		●				S	S	S			S	S	S
0397					●	Q							
0410			●		●	Q							
0415					●	Q							
0416					●	Q							
0417					●	Q							
0418					●	Q							
0419					●	Q							
0420					●	Q							
0421					●	Q							
0422					●	Q							
0423					●	Q							
0424					●	Q							
0425					●	Q							
Piezometers On-Site													
P015			●		●	Q							
P025			●		●	Q							
P027			●		●	Q							
P031			●		●	Q							
P043					●	Q							
P044					●	Q							
P045					●	Q							
P046					●	Q							
On-Site Production Wells													
0071				●				W			M	Q	M
0076				●				W			M	Q	M
0271				●				W			M	Q	M
Groundwater Seeps													
0601		●				Q	Q	W	Q	Q			
0602		●				Q	Q						
0603		●				Q	Q		Q				
0605		●				Q	Q		Q				
0606		●				Q	Q		Q	Q			
0607		●				Q	Q	W	Q				
0608		●				Q	Q						
0609		●				Q	Q		Q	Q			

Attachment 1

Excel Spreadsheet of Monitoring Objectives, Parameters and Schedule

SUPPLEMENTAL GROUNDWATER MONITORING PLAN	OBJECTIVE					SAMPLING PARAMETERS AND SCHEDULE							
	Community Assurance	Early Warning	Assure Containment	Site-Worker Assurance	OU1 Effectiveness	Volatile Organic Compounds (VOCs)	TAL Metals	Tritium	Nitrate/Nitrite	Nitrite	Isotopic Plutonium	Thorium	Uranium
Monitoring Well Trenches On-Site													
0712		o				S	S	WS					
0713		o				S	S	WS					
0714		o				S	S	WS					
0725		o						W					
0726		o				S	S	WS					
0727		o				S	S	WS					
Off-Site Monitoring Wells													
0123			o			A	A	A					
0127	o							Q					
0128	o							Q					
0129	o		o			A	A	Q			S	S	S
0158			o			A	A	A					
0302	o		o			A	A	A					
0303	o		o			A	A	Q			S	S	S
0343			o			A	A	A					
0376	o		o			A	A	Q			S	S	S
0377	o		o			A	A	Q			S	S	S
0378			o			A	A	A					
0383	o		o			A	A	Q			S	S	S
0389			o			A	A	A					
0392			o			A	A	A					
Private Wells													
0904	o							M					
0905	o							M					
0906	o							M					
0907	o							M					
0909	o							M					
0912	o							M					
Community Water Supplies													
Franklin	o							M					
Germantown	o							M					
Miamisburg	o							M			M		M
Middletown	o							M					
Springboro	o							M					
Tipp City	o							M			M		M
West Carrollton	o							M					

Sampling Frequency

W = Weekly
M = Monthly
Q = Quarterly
S = Semi-annually
A = Annually

Attachment 2

Responsibility Matrix for Groundwater Monitoring Under the Groundwater Monitoring Plan

Objective	Funding	Execution
Site Worker Assurance, SDWA Monitoring	ET&M	ET&M
Community Assurance	ET&M	ET&M
Early Warning from established baselines	ER	ET&M
Early Warning, all other	ER	ER
Assure Containment	ER	ET&M
Assure containment near plant drinking water supply	ER	ER
Establish baseline for effluent comparison	ET&M	ET&M

Plates

Plate 1: Mound Groundwater Monitoring Network – Monitoring Objectives

Plate 2: Mound Groundwater Monitoring Network – Unused Wells

Plate 3: Mound Groundwater Monitoring Network


0606
0607
0603
0608
0605
0312
0725
0726
0727
0733
0734
0395
0601
0111
0602
0345
0346
0119
0314
0123
0369
0125
0382
0379
0127
0128
0343
0303
0129
0907
0176
0906
0377
0905
0378
0382
0410
P015
0071
P027
0353
0317
0271
P031
0609
0158
Legend
COMMUNITY ASSURANCE
SITE-WORKER ASSURANCE
ASSURE CONTAINMENT
EARLY WARNING
MOUND
MOUND GROUNDWATER MONITORING NETWORK MONITORING OBJECTIVES
UNCLASSIFIED
E/SE


Legend
UNUSED WELLS
MOUND GROUNDWATER MONITORING NETWORK UNUSED WELLS
UNCLASSIFIED

Appendix A

Table A-1. Monitoring well, production well and piezometer information for the Mound Plant and off-site.

Well I.D.	Installation Date	Project	Consistency With TEGD	Original Project Complete	Aquifer Type	Hydro. Regime	Location Or Release Block	Future Use
0001	23-Jul-76	BVAE	No	Yes	BVA-L	BVA-D	Offsite	Abandoned
0002	26-Jul-76	BVAE	No	Yes	BVA-L	BVA-D	Offsite	Abandoned
0003	27-Jul-76	BVAE	No	Yes	BVA-U	BVA-D	Offsite	Abandoned
0004	28-Jul-76	BVAE	No	Yes	BVA-L	BVA-D	Offsite	Abandoned
0006	15-Jul-76	BVA-E	No	Yes	BVA-L	BVA-D	Offsite	Abandoned
0008	18-Sep-76	BVAE	No	Yes	BVA-L	BVA-D	Offsite	Abandoned
0020	Ca. 1975	BVAE	No	Yes	BDRK		K	Abandoned
0028	Ca. 1975	BVAE	No	Yes	BDRK		M	Abandoned
0042	Ca. 1975	PWSP	No	Yes				Abandoned
0055	Ca. 1975	PWSP	No	Yes			I	Abandoned
0108	Ca. 1975	BVAE	No	Yes	BVA-U	BVA-D	Offsite	Abandoned
0122	19-Nov-87	OU-1 RI/FS	Yes	Yes	BVA-U		K	Abandoned
0151	6-Jul-87	DOE ES	Yes	Yes	US	US	C	Abandoned
0152	8-Jul-87	DOE ES	Yes	Yes	BVA-U	BVA-D		Abandoned
0153	10-Jul-87	DOE ES	Yes	Yes	BVA-U			Abandoned
0154	4-Oct-87	OU1 RI/FS	Yes	Yes	BVA-U			Abandoned
0155	5-Oct-87	OU1 RI/FS	Yes	Yes	BVA-U			Abandoned
0227	27-May-76	PWSP	No	Yes	BDRK			Abandoned
0236	Ca. 1975	PWSP	No	Yes	---			Abandoned
0242	Ca. 1975	PWSP	No	Yes	BDRK			Abandoned
0276	4-Apr-61	MRC	No	Yes	BVA-U			Abandoned
0306	2-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-U			Abandoned
0310	16-Aug-89	OU-1 RI/FS	Yes	Yes	BDRK			Abandoned
0349	21-Mar-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	Q	Abandoned
0350	7-Mar-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	D	Abandoned
0352	6-Feb-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	C	Abandoned
0355	21-Feb-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	F	Abandoned
0371	5-Apr-61	Other	Yes	Yes	BVA			Abandoned
0375			Yes	Yes	BVA-U			Abandoned
0471	5-Apr-61	Other	No	Yes				Abandoned
0571	6-Apr-61	Other	No	Yes				Abandoned
0812	23-Sep-83	NPE	No	Yes				Abandoned
0817	26-Sep-83	NPE	No	Yes				Abandoned
0827	22-Sep-83	NPE	No	Yes				Abandoned
0832	22-Sep-83	NPE	No	Yes	BVA		Offsite	Abandoned
0005	29-Jul-76	BVAE	No	Yes	BVA	BVA-D	Offsite	None Identified
0007	18-Nov-76	BVAE	No	Yes	BVA-U	BVA-D	Offsite	None Identified
0033	13-May-76	PWSP	No	Yes	BDRK	MAIN	L	None Identified
0034	26-May-76	PWSP	No	Yes	BDRK	MAIN	Q	None Identified
0046	22-Jun-74	Other	No	Yes	BVA-U	BVA	I	None Identified
0063	18-Jun-74	Other	No	Yes	BVA	BVA	I	None Identified
0101	Ca. 1976	BVAE	No	Yes	BVA-U	BVA-D	Offsite	None Identified
0106	Ca. 1976	BVAE	No	Yes	BVA-U	BVA-D	Offsite	None Identified
0112	18-Nov-87	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	L	None Identified
0113	16-Nov-87	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	N	None Identified
0114	11-Nov-87	OU-1 RI/FS	Yes	Yes	BRDK	MAIN	R	None Identified
0115	10-Nov-87	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	R	None Identified
0117	2-Dec-87	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	M	None Identified
0118	20-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-U	Offsite	None Identified
0120	4-Dec-87	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	M	None Identified
0121	12-Nov-87	OU-1 RI/FS	Yes	Yes	BDRK	SMPP-U	Offsite	None Identified
0124	13-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None Identified
0126	16-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None Identified
0127	2-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None Identified
0128	30-Sep-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None Identified
0137	24-May-76	PWSP	No	Yes	BVA-U	BVA	C	None Identified

Table A-1. Monitoring well, production well and piezometer information for the Mound Plant and off-site.

Well I.D.	Installation Date	Project	Consistency With TEGD	Original Project Complete	Aquifer Type	Hydro. Regime	Location Or Release Block	Future Use
0138	28-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-U	Offsite	None Identified
0159	18-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None Identified
0160	18-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-u	BVA-d	Offsite	None Identified
0307	4-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	I	None Identified
0308	4-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	I	None Identified
0309	21-Aug-89	OU-1 RI/FS	Yes	Yes	BDRK	SMPP	S	None Identified
0311	4-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	None Identified
0312	13-Dec-89	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	K	None Identified
0315	7-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	C	None Identified
0316	5-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	I	None Identified
0317	18-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	I	None Identified
0318	9-Aug-89	OU-1 RI/FS	Yes	Yes	BDRK	SMPP	F	None Identified
0320	19-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	B	None Identified
0322	1-Apr-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN/SMPP	F	None Identified
0323	7-Feb-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	M	None Identified
0324	8-Feb-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	M	None Identified
0325	4-Apr-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	F	None Identified
0326	3-Apr-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	F	None Identified
0329	19-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	None Identified
0336	21-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	None Identified
0337	21-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	None Identified
0340	2-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	None Identified
0341	30-Mar-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	Offsite	None Identified
0342	5-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	None Identified
0347	20-Feb-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	C	None Identified
0351	9-Jan-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	D	None Identified
0354	20-Apr-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	B	None Identified
0356	24-Jan-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	B	None Identified
0380	17-Dec-92	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	I	None Identified
0381	8-Jan-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	I	None Identified
0385	17-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	None Identified
0390	29-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	None Identified
0400	28-Jun-94	OU-5	Yes		BVA	BVA	B	None Identified
0721	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	M	None Identified
0722	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	M	None Identified
0725	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	N	None Identified
0156	27-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None - Transferred Ownership
0157	26-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	None - Transferred Ownership
0304	20-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	None - Transferred Ownership
0305	22-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	S	OU-1 Remedialtion Effectiveness
0313	4-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	I	OU-1 Remedialtion Effectiveness
0370	7-Dec-92	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	I	OU-1 Remedialtion Effectiveness
0373	15-Dec-92	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	I	OU-1 Remedialtion Effectiveness
0372	7-Jan-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	I	OU-1 Remediation Effectiveness
0374	6-Dec-92	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	I	OU-1 Remediation Effectiveness
0393	5-Jan-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	I	OU-1 Remediation Effectiveness
0394	3-Dec-92	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	I	OU-1 Remediation Effectiveness
0397	6-Dec-92	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	I	OU-1 Remediation Effectiveness
0412	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0412SVE	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0413	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0414	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0414SVE-D	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0414SVE-S	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0415	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0416	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness

Table A-1. Monitoring well, production well and piezometer information for the Mound Plant and off-site.

Well I.D.	Installation Date	Project	Consistency With TEGD	Original Project Complete	Aquifer Type	Hydro. Regime	Location Or Release Block	Future Use
0417	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0418	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0419	1996	OU-1	Yes	No				OU-1 Remediation Effectiveness
0071	Jan. 1962	PW	Yes	Yes	BVA-U	BVA	I	Production Well SDWA
0076	10-Dec-47	PW	Yes	Yes	BVA-U	BVA	I	Production Well SDWA
0271	14-Jan-48	PW	Yes	Yes	BVA	BVA	I	Production Well SDWA
0327	15-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Background Monitoring
0328	15-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Background Monitoring
0330	18-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Background Monitoring
0333	7-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Background Monitoring
0334	2-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Background Monitoring
0399	15-Jun-94	OU-5	Yes	Yes	BDRK	SMPP	B	Background Monitoring
0319	23-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-U	BVA	B	Supplemental Monitoring
0332	2-Apr-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	H	Supplemental Monitoring
0344	1-Feb-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	B	Supplemental Monitoring
0402	30-Jun-94	OU-5	Yes		BVA	BVA	S	Supplemental Monitoring
0411	20-Jun-94	OU-5	Yes		BDRK	SMPP	B	Supplemental Monitoring
0420	Not installed						I	Supplemental Monitoring
0421	Not installed						I	Supplemental Monitoring
0422	Not installed						I	Supplemental Monitoring
0423	Not installed						I	Supplemental Monitoring
0387	31-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Supplemental Monitoring
0386	23-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Supplemental Monitoring BVA
0116	2-Nov-87	OU-1 RI/FS	Yes	Yes	BDRK	MAIN	R	Supplemental Monitoring
0395	22-Feb-93	OU-9 RI/FS	Yes	Yes	US	US	F	Supplemental & Replace
0111	17-Nov-87	OU-1 RI/FS	Yes	Yes	US	US	F	Supplemental Monitoring
0119	13-Nov-87	OU-1 RI/FS	Yes	Yes	US	US	C	Supplemental Monitoring
0123	7-Oct-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	Supplemental Monitoring
0125	10-Nov-87	OU-1 RI/FS	Yes	Yes	US	US	J	Supplemental Monitoring
0129	5-Nov-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	Supplemental Monitoring
0158	9-Nov-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	A	Supplemental Monitoring
0302	15-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Supplemental Monitoring
0303	6-Sep-89	OU-1 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Supplemental Monitoring
0314	3-Aug-89	OU-1 RI/FS	Yes	Yes	BDRK	SMPP	C	Supplemental Monitoring
0335	29-Mar-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	Offsite	Supplemental Monitoring
0343	7-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Supplemental Monitoring
0345	5-Feb-93	OU-9 RI/FS	Yes	Yes	US	US	C	Supplemental Monitoring
0346	3-Apr-93	OU-9 RI/FS	Yes	Yes	BDRK	US	C	Supplemental Monitoring
0353	9-Feb-93	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	S	Supplemental Monitoring
0376	5-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Supplemental Monitoring
0377	4-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Supplemental Monitoring
0378	3-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Supplemental Monitoring
0379	5-Dec-92	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	I	Supplemental Monitoring
0382	16-Dec-92	OU-9 RI/FS	Yes	Yes	BDRK	SMPP	C	Supplemental Monitoring
0383	24-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Supplemental Monitoring
0388	12-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-U	BVA	Offsite	Supplemental Monitoring
0389	24-Mar-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Supplemental Monitoring
0392	1-Apr-93	OU-9 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Supplemental Monitoring
0410	12-Jul-94	OU-5	Yes	No	BVA	BVA	I	Supplemental Monitoring
0712	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	N	Supplemental Monitoring
0713	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	R	Supplemental Monitoring
0714	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	R	Supplemental Monitoring
0726	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	R	Supplemental Monitoring
0727	Ca. 1987	GWTA	No	Yes	BDRK	MAIN	R	Supplemental Monitoring
0904	14-Apr-77	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0905	UNK	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring

Table A-1. Monitoring well, production well and piezometer information for the Mound Plant and off-site.

Well I.D.	Installation Date	Project	Consistency With TEGD	Original Project Complete	Aquifer Type	Hydro. Regime	Location Or Release Block	Future Use
0906	12-Apr-77	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0907	8-Apr-77	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0909	1986	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0912	1932	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0913	1935	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0918	1950	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0919	1950	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0920	1950	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0921	1950	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0922	UNK	OS Mon.	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0923	29-Nov-90	WMFPP	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0924	29-Nov-90	WMFPP	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0925	21-Nov-90	WMFPP	No	NA	BVA	BVA	Offsite	Supplemental Monitoring
0130	6-Nov-87	OU-1 RI/FS	Yes	Yes	BVA-U	BVA-D	Offsite	Water Level Monitoring
0301	9-Aug-89	OU-1 RI/FS	Yes	Yes	BVA-L	BVA	Offsite	Water Level Monitoring
0348	9-Mar-93	OU-9 RI/FS	Yes	Yes	BDRK	MAIN	N	Water Level Monitoring
P002	22-Nov-92	OU-9	Yes	Yes	BDRK	SMPP	I	None Identified
P004	18-Nov-92	OU-9	Yes	Yes	BDRK	SMPP	I	None Identified
P008	20-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P009	23-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P013	23-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P014	24-Oct-92	OU-9	Yes	Yes	BVA	BVA	I	None Identified
P016	16-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P017	6-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P019	1-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P020	4-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P021	21-Jan-93	OU-9	Yes	Yes	BDRK	MAIN	C	None Identified
P022	12-Jan-93	OU-9	Yes	Yes	BDRK	MAIN	C	None Identified
P023	18-Jan-93	OU-9	Yes	Yes	US	US	C	None Identified
P024	22-Jan-93	OU-9	Yes	Yes	BDRK	SMPP	C	None Identified
P025	2-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P028	2-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P029	6-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P030	17-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P032	1-Feb-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P035	2-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P036	19-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P037	27-Apr-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P038	19-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P039	9-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P040	9-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P041	8-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P042	8-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	None Identified
P001	9-Nov-92	OU-9	Yes	Yes	BVA	BVA	I	OU-1 Remediation Effectiveness
P003	7-Nov-92	OU-9	Yes	Yes	BVA	BVA	I	OU-1 Remediation Effectiveness
P005	21-Nov-92	OU-9	Yes	Yes	BVA	BVA	I	OU-1 Remediation Effectiveness
P006	25-Oct-92	OU-9	Yes	Yes	BVA	BVA	I	OU-1 Remediation Effectiveness
P031	11-Jan-93	OU-9	Yes	Yes	BVA	BVA	S	Supplemental
P015	26-Oct-92	OU-9	Yes	Yes	BVA	BVA	S	Supplemental Monitoring
P026	21-Apr-93	OU-9	Yes	Yes	BVA	BVA	offsite	Supplemental Monitoring
P027	9-Jan-93	OU-9	Yes	Yes	BVA	BVA	S	Supplemental Monitoring
P018	22-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	Water Level Monitoring
P033	13-Jan-93	OU-9	Yes	Yes	BVA	BVA	B	Water Level Monitoring
P034	17-Mar-93	OU-9	Yes	Yes	BVA	BVA	offsite	Water Level Monitoring

Table A-1. Monitoring well, production well and piezometer information for the Mound Plant and off-site.

Well I.D.	Installation Date	Project	Consistency With TEGD	Original Project Complete	Aquifer Type	Hydro. Regime	Location Or Release Block	Future Use

NA - Not Available
BDRK - Bedrock
BVA - Buried Valley Aquifer
US - Unconsolidated Sediments
MAIN - Main Hill
SMPP - SM/PP Hill
GWTA - Groundwater Tritium Assessment
PW - Mound Plant Production Well
NPE - New Property Evaluation
BVAE - Buried Valley Aqifer Evaluation
PWSP - Portable Water Standards Project
ERRI - ER Program Remedial Investigation
DOE ES - Department of Energy Environmental Survey
TEGD - Technical Enforcement Guidance Document (EPA 1986)